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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
NGAMPA, BRIGET P	

ART UNIT	PAPER NUMBER
1792	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/683,810	FAN ET AL.	
	Examiner	Art Unit	
	Briget P. Ngampa	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *18 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Detailed Action

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. Claims 1-23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. With respect to claim 1, there is no support for the new limitation "without the presence of hydrophilic compound". With respect to claims 1, 21 and 23, applicant has no support in the specification for the language "consisting essentially of" because there is no support that applicant envisioned the use of insignificant amount of other components or the presence of other steps which do not materially affect the characteristics of the invention.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

> the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-2, 5-6, and 8-12 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brinker et al. (U.S patent number 6,264,741 B1, hereafter '741).

With respect to claims 1 and 23, '741 teach a method for making a nanocrystalline micellar solution [col 2, lines 25-26], comprising:

a) making a solution comprising a hydrophobic material [col 2, line 27], an organic solvent [col 2, line 29];

b) a surfactant [col 2, line 28] and water or alcohol [col 2, line 28-30];

c) and removing at least a portion of said organic solvent [col 2, lines 32-33] to form a nanocrystalline micellar solution [col 2, line 32-37]. '741 do not teach the claimed order of mixing the ingredients. It has been held that any order of mixing ingredients is prima facie obvious (see MPEP 2144.04.1V.C.). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have mixed the ingredients of '741 in the order i) mixing hydrophobic material and organic solvent; ii) mixing surfactants and water; iii) mixing the solution formed by i) and ii) and finally iv) adding the hydrophilic compound; because any order of mixing is prima facie obvious. Examiner interpreted the step of "mixing....without the presence of a hydrophilic compound" as hydrophilic compound could be added last since the order of adding ingredients is not specified. Therefore the hydrophilic compound can be part of the ingredient as required by '741. It would have been obvious to one of ordinary skill in the art at the time of the invention to have added the ingredients as listed from i) to iv) since the order of mixing is prima facie obvious.

With respect to claim 2, '741 teach all the limitations of claim 1; it further teaches that the third solution is deposited on a silicon substrate [col 5, line 66], prior to removing a portion of the organic solvent [col 5, line 67].

With respect to claims 5 and 6, '741 teach all the limitations of claim 1. It further teaches the surfactant being anionic [col 4, line 41] consisting of sulfates [col 4, lines 44].

With respect to claim 8, '741 teach all the limitations of claim 1. It further teaches removing at least a portion of the organic solvent using an evaporation [co16, line1] process.

With respect to claims 9, 10, 11 and 12, '741 teach the limitation of claim 1. It further teaches the precursor co-assembling material could be a metal oxide [col 3, line 9-13] such as alkoxysilane [col 4, lines 29-31], further that the alkoxysilane is tetraethylorthosilicate [col 4, line 30].

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brinker et al. (U.S patent number 6,264,741 B1, hereafter '741); further in view of Liu et al. (Patent number 6, 872, 450 B2, hereafter '450).

With respect to claim 3, '741 teach the limitation of claim 1. '741 do not teach that the hydrophobic material could be a hydrophobic polymer. '450 teach nanocrystals made of diblock polymer coating to form a micelle [col 4, lines 4-13] comprising a hydrophobic functional group (fig 1, 36) (hydrophobic polymer) to assemble around surface coated nanocrystals. It would have been obvious to one of ordinary skill in the art at the time of the invention to have used nanocrystals made of diblock polymer comprising a hydrophobic functional group coating to form a micelle [col 4, lines 4-13] which will assemble around surface coated nanocrystals because '450 teaches that it is a suitable method.

5. Claims 4, 7, 18 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brinker et al. (U.S patent number 6,264,741 B1, hereafter '741); further in view of Petruska (Patent number 7,226,953 B1, hereafter '953).

With respect to claims 4, 18 and 22, '741 teach the limitations of claim 1. '741 do not specifically teach that the hydrophobic material could be CdSe. '953 teaches that the nanocrystalline micellar solution contain at least one nanocrystalline hydrophobic precursor compound [col 3, line 39-41] which could be a CdSe [col 7, line 15].

Therefore, it would have been obvious to one of ordinary skills in the art at the time of the invention to have selected CdSe as a hydrophobic material to form the nanocrystal micellar solution of '741 with reasonable expectation of success because '983 recognize it as a suitable core for nanocrystal micellar formation.

With respect to claim 7, '741 teach the limitation of claim 1; it does not teach that the organic solvent could be toluene. '953 teach that toluene [col 5, line 14-17] is a preferred organic solvent used in the process. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have combine toluene as an organic solvent in the process with reasonable expectation of success because '953 recognize toluene as a prefer organic solvent.

6. Claims 14 -16 are rejected under 35 U.S.C 102 (b) as being unpatentable over Brinker ('741) in view of Brinker et al. (U.S. patent number 6,387,453 B1, hereafter '453).

With respect to claims 14 and 15, '741 teach the limitations of claim 9. It does not teach the nanocrystalline micellar solution processed in the presence of an acid to form a mesophase nanocrystalline array solution; and a thin film of the mesophase nanocrystalline array solution deposited on a substrate. '453 teaches nanocrystalline micellar solution is processed in the presence of an acid [col 4, line 55] to form a mesophase nanocrystalline array solution [col 4, line 58-59]; and a thin film of the mesophase nanocrystalline array solution is •deposited on a substrate [col 4, line 56-

57]. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have added the acid in order to organize the micelles and deposit a thin film on a substrate to carry further analysis to confirm the organized structure.

With respect to claim 16, '741 teach the limitations of claim 15 above. It further teaches the substrate being the silicon [col 5, line 66].

7. Claim 17 is rejected under 35 U.S.C 102 (b) as being unpatentable over Brinker ('741) and Brinker et al. (U.S. patent number 6,387,453 B1, hereafter '453) further in view of Benzing et al. (U.S. patent number 6,528,153 B1, hereafter '153).

With respect to claim 17, '741 and '453 teach the limitations of claim 9 to form a mesophase nanocrystalline network. '741 do not teach the limitation of claim 9 in the presence of a base to precipitate a three-dimensional network. '153 teach that TEOS may be hydrolyzed and condensed [col 2, line 63] to precipitate a three-dimensional network [col3, line 1]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have catalyzed hydrolysis and condensation of the sol of '741 and '453 with reasonable expectation of success because bases are suitable catalysts for sols.

8. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brinker ('741) further in view of Treadway et al. (Patent number 6,815,064 B2, hereafter '064).

With respect to claim 13, '741 teach the limitations of claim 9 above. '741 further teach that the nanoparticles may be secured in a silica sol binder. '741 do not teach the precursor co-assembly material being polythiophene polymer. However, '064 teach that polythiophene polymers [col9, lines 37-42] may be used instead of silica sols as a binder for nanoparticles. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have added a precursor co-assembly material such as polythiophene polymer instead of Silica sol of '741 because '064 teaches that polythiophene is a suitable binder for nanoparticles.

9. Claim 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brinker ('741); further in view of Fitzgerald et al. (Patent number 6,232,090 B2, hereafter '090).

With respect to claims 19 and 20, '741 teach all the limitations of claim 1. It does teach that the nanocrystalline micellar solution is prepared in less than 10 minutes at room temperature. '090 teaches that TMOS (tetramethoxysilane) sol are prepared in approximately 30 seconds [col 3, lines 2-4] and at room temperature [col 1, lines 34-35].
t the time of the invention to have used a base instead of an acid to have
Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have used the time and temperature of '090 with reasonable expectation of success because '090 teach that they are suitable conditions for TMOS sol preparation.

10. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kan et al. (U.S. patent number 6,646,302 B2, hereafter '302) in view of Brinker ('453) further in view of Petruska (U.S. patent number 7,226,953 B1, hereafter '953) and Brinker ('741).

With respect to claim 21, '302 teaches P-type Si substrate [180], [col 6, line 43-44]; with back side contacts [176,178], [col 6, line 45] depositing nanocrystal gold, and forming capacitor [fig 16, 110], but does not teach forming the gold nanocrystal layer by making a first solution. '741, '453 and '953 teach a suitable method to deposit nanocrystals as discussed above regarding claim 1. It would have been obvious to one of ordinary skills in the art at the time of the invention to have used the method of '741, '457 and '953 to deposit the gold nanocrystals of '302 with reasonable expectation of success because it is recognized as suitable method.

(11) Response to Argument

Applicant is arguing that the cited references do not teach the method of making a nanocrystalline micellar solution with hydrophobic material and a surfactant in water without the presence of a hydrophilic material. It has been held that any order of mixing ingredients is

prima facie obvious (see MPEP 2144.04.1V.C.). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have mixed the ingredients of '741 in the order i) mixing hydrophobic material and organic solvent; ii) mixing surfactants and water; iii) mixing the solution formed by i) and ii) and finally iv) adding the hydrophilic compound; because any order of mixing is prima facie obvious.

Examiner interpreted the step of "mixing....without the presence of a hydrophilic compound" as hydrophilic compound could be added last since the order of adding ingredients is not specified. Therefore the hydrophilic compound can be part of the ingredient as required by '741. It would have been obvious to one of ordinary skill in the art at the time of the invention to have added the ingredients as listed from i) to iv) since the order of mixing is prima facie obvious.

Conclusion

2. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Briget P. Ngampa whose telephone number is 571-270-1866. The examiner can normally be reached on M-F, 830-4:30PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MICHAEL CLEVELAND
SUPERVISORY PATENT EXAMINER

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